Financing Growth through Venture Capital in Asia and the Pacific

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FINANCING GROWTH THROUGH VENTURE CAPITAL IN ASIA AND THE PACIFIC

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Discussion Paper

Macroeconomic Policy and Financing for Development Division

Financing Growth through Venture Capital in Asia and the Pacific

by

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March 2016

Abstract

In this study I provide an assessment of the factors that make Venture Capital (VC) a form of financial intermediation able to contribute to fostering innovation and economic growth, with particular reference to Asia and the Pacific. I review the economics of VC, focusing more on the aspects that are relevant for policy. I also review what conditions are conducive to innovation and growth, and examine recent evidence on public policy for venture capital. I conclude examining some descriptive evidence on the state of VC markets in the Asia and Pacific, comparing them to those of North America and Europe.

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I. Introduction

In this study I provide an assessment of the factors that make Venture Capital (VC) a form of financial intermediation able to contribute to fostering innovation and economic growth, with particular reference to Asia and the Pacific.

In Section II, I briefly review the literature on VC as a specialized financial intermediary. I will show the constraints under which VC firm operate; in particular, the need to satisfy the requirements set by institutional investors (Limited Partners, LPs), which are the ultimate source of funding for innovative companies. I also describe how VC investors operate, pointing to several distinctive traits that set them apart from other investors, like banks, corporations, the crowd, and wealthy individuals. Based on this knowledge about venture investors I consider evidence on their contribution to innovation and economic growth, both at industry and at firm level.

In Section III, I focus on which factors have been shown to favor and support the growth of an effective venture industry. Section IV I bring the analysis to policy level, and I examine evidence on how active policy can, or cannot, support an effective venture industry. Finally, Section V looks more specifically at issues and opportunities relevant for the Asia and Pacific regions.

II. How Does Venture Capital Contribute to Innovation and Economic Growth?

A. What is venture capital? A primer

Venture capital is a specialized form of financial intermediation that provides funding to innovative new ventures with high-growth prospects (Da Rin, Hellmann and Puri, 2013). Therefore, VC firms largely invest funds provided by other institutions or by wealthy individuals. Institutional investors (banks, insurance companies, sovereign wealth funds, family offices, etc.) invest in VC as part of their allocation to 'alternative assets.' This is very important, because intermediation creates constraints and incentives that are quite different from those that one would observe for investors that contribute their own money.

A major problem that intermediated venture finance needs to solve is a classic principal-agent problem, where an agent who acts on behalf of a principal can exploit his superior knowledge to take advantage of the principal (Sahlman (1990)). In the context of VC investing, institutional investors (the principals) contribute money to VC firms (the agents) which can behave opportunistically in many ways (see Phalippou (2009)). For example, they can invest in companies that are outside the intended strategy (say in data science instead of nanotechnology), or in companies whose prospects are not very good but that the VC wants to bolster to show good performance before raising funds from other investors.

As a solution, to these problems, at least partial, VC firms raise money through closed-end fund vehicles that typically last ten years. The finite duration of these vehicles forces VC firms to disclose the true value of their investments, which need to be realized by the fund's end date. At that point, institutional investors will be able to know the 'true'

return to their investment, and can make an informed decision whether to participate in the VC's future funds or not.

This structure, based on sequential fund-raising through closed-end fund vehicles that allow revelation of information about true investment returns, is central to the VC industry. For anybody looking from the outside, like a policy-maker or an entrepreneur, it is important to be aware of it because of several implications.

First, institutional investors allocate money to VC firms on a comparative basis. Typically, an institutional investor will first decide an allocation of its portfolio to alternative assets, then to private equity, and within this to venture capital. Once the allocation to VC is decided, the investor will select in which VC firms to invest over several months. This puts much pressure on VC firms to deliver good returns on each of their funds, especially after the collapse of the dot.com bubble has made investors less keen to invest in this asset class.

Second, the ten year span of fund vehicles implies that VC firms have a well-defined time-frame for investment. The first few years are called the 'investment period,' when the VC firm attracts, selects, and contracts with portfolio companies. The later years are called the 'harvest period', when the VC prepare the company for sale, most often through IPO or acquisition. For entrepreneurs this has to important consequences: (i) they can access funding only when a fund vehicle has been recently raised, so some VC firms may not always be accessible, and (ii) they are under pressure to deliver growth within about 5 years from funding. Such pressure naturally translates to portfolio companies. This is what makes VC such a powerful form of financial intermediation, but also an extremely demoing one for companies: there is little mercy for non-performers.

Third, the closed-end nature of the fund vehicle bring additional implications for entrepreneurs. Companies which receive venture funding will need to be able to reach strong growth very soon, in order to become palatable to the market. Otherwise they risk being closed down, or sold at a low price when the time of wrapping up the fund vehicle comes. Also, companies in the portfolio of a VC are sometimes competing for scarce funding and scarce attention by the VC partners. This may lead to short-termism by of their funders, who may sacrifice long-term growth in order to deliver tangible short-term results.

VC is therefore a powerful source of entrepreneurial finance. In particular, the specialized nature of intermediation that VC provides allows institutional investors to open their investment strategies to the very risky investments into entrepreneurial companies. In other words, VC allows mobilizing savings for funding innovative ventures. It is therefore an extremely valuable component of financial markets. As we will see in section III.D, VC is also quite distinct from other non-intermediated sources of entrepreneurial finance, and therefore enriches the set of possible funding sources for innovative entrepreneurs.

At the same time, VC is also limited to funding a specific type of firms, those which can mature quickly and grow substantially within a very few years. This is a very important characteristics, which is often not appreciated enough by policy-makers: VC funding is only for very few companies, those which can grow very fast and attain a considerably large value within a few years. VC is therefore is not a universally usable tool for

fostering innovation, and such limitation should be clearly understood and respected by policy-makers.

B. Captive venture capital firms

While VC firms are mostly financial intermediaries, there are also some investors that are owned by an organization, and are therefore called 'captives.' Parent organization are most often industrial companies (like Siemens Venture Capital) or financial firms (like Citigroup), but also government agencies (like FinPiemonte, the financial investor of the Piedmont region in Italy). We can include also public development agencies among captive investors, since they are also financed by a captive owner that shields them from market pressure. To contrast them from captives, it is common to identify the VC firms that act as intermediaries as 'independent' VCs.

The defining trait of captive venture investors is that they do not have a purely financial objective. While independent VCs need to generate large enough returns to be able to raising new funds from the market, captive VCs are funded by their parent organization. Their parents also give them investment mandates, which are often a mixture of financial and strategic goals (Hellmann (2002), Masulis and Nahata (2009)). For corporate VCs (or CVCs), a key priority is to gain access to new technology developed by nimble and innovative ventures (Da Gbadji, Gailly. and Schwienbacher (2015), Dushintsky and Lenox (2005)). Investment can also be used to gain toe-holds that allow getting acquainted with a new company and decide its future acquisition (Benson and Ziedonis (2010)), or to attract talented individuals (De Bettignies and Chemla (2008)). Indeed, CVCs often invest in younger and less mature—and therefore riskier—companies than VCs (Maula and Murray (2001), Chemmanur, Loutskina, and Tian (2014)). For entrepreneurs these patterns mean that a corporate investor can be a very attractive investor when the new venture is complementary to it, for example because it develops products that create demand for the established incumbent. An example could be software firms that develop application for an operating system. Such companies can find in CVCs initially a financier, and later on an acquirer.

Financial firms often own growth-equity investors, which constitute a second important type of captive investors. The evidence shows that bank-owned investors tend to invest in companies that are less risky than the typical start-up (Mayer, Schoors, and Yafeh (2005)), and that will later become clients of the investor's parent organization (Hellmann, Lindsey, and Puri (2008)).

The third important category of captive investors has a public nature, and comprises a variety of agencies and financial companies that are used to foster technology and employment at regional or national level (see Duruflé (2010) for an overview). These investors are quite heterogeneous and they tend to invest in early stage companies or companies that have difficulty finding financial support in the market (see an assessment of the Australian experience in Cowling, Murray, and Liu (2010)). An interesting fact is that companies that receive public VC funds alongside with private VC funding tend to raise more money, produce more patents, and have more successful outcomes than companies that raise only public or only private funding (Brander, Du, and Hellmann (2010)). This suggests that public and private funding are complements and that entrepreneurs whose business idea allows them to raise both types of funding can obtain

more financial resources and more support from the very professional independent VCs.

To conclude this section, it is important to notice that in venture markets which are less developed, like Asia and Europe, compared to the US, independent VCs are (relatively) fewer and less important as source of funding for new ventures, especially those at an early stage of development.

C. How do venture capital firms operate?

1. Organization

In this sub-section, I am going to describe in some detail how VC firms operate, in order to better understand their contribution to innovation and growth. First, I look at independent VC firms. These are typically small partnership of less than a dozen individuals (Hsu and Kenney (2005)). VC partners are most often former entrepreneurs or industry executives with several years of experience in running and creating companies (Ewens and Rhodes-Kropf (2015)). Several studies document the important role of human capital for venture investing (Dimov and Shepherd (2005), Zarutskie (2010)). The business experience of VC partners has been shown to lead to more support for portfolio companies and to better exit outcomes (Bottazzi, Da Rin, and Hellmann (2008)).

Captive VC exhibit more variety of organizational forms, but these are rarely partnerships. Corporate VCs are often structured as divisions or subsidiaries, and similarly bank-owned VCs. Public development agencies can take many different structures, often determined by national legal requirements. While independent VC firms need to build and maintain a reputation to be able to repeatedly return to the market to raise funding, captive VCs are not subject to such discipline. In a way this makes them more resilient and nimble, since their very existence and operations depend on the decision of their parent organization, As long as the parents has funds to commit to new investments and is satisfied with the performance of its venture arm, investments will continue. However, for the same reason, captive VC firms may also be quickly folded up if they no longer correspond to the goals of their parent's management. Or they can be left with fewer resources, making it difficult to support, financially and managerially, their portfolio companies. This is clearly poses a threat to entrepreneurs, especially when their venture requires reliable support over long periods of time.

Another important difference between independent and captive VCs concerns the way that professionals are remunerated. Talent requires compensation, and this is the case also in venture capital. Independent VC partnership rely on strong incentives to attract and retain talented partners. Partners share the profits of the firm, which are typically about 20% of the capital gain on exited companies. Compensation is very different at captive firms, where professionals are employees whose compensation is largely a fixed salary. These poses a challenge to captive VCs, because they find it difficult to hire top talent without the lure of a share of the firm's profits. As Dushnitsky and Shapira (2010) document, few corporate VCs adopt high-powered compensation practices in the UK, and those who do tend to invest in riskier but also more successful companies.

2. Strategy

Beyond organization, an important dimension that determines VC firms' operations is their investment strategy. Here the difference between independents and captives is less relevant, as both types of VCs have (some) freedom in how they manage their portfolios. Given that experience is the core competency of VC partners, it is not surprising that VC investors often specialize in sectors and regions where partners have their knowledge, network of contacts, and ability to assess business plans, and that those which do are often more successful (Gompers, Kovner, and Lerner (2009)).

VC investors face three main challenges in their investment activity: generating and negotiating a steady flow of good deals, supporting the portfolio companies in their quest for growth, and exiting the investments successfully. As we are going to see, all these activities are time-consuming and require specialized knowledge and considerable talent. By reviewing their nature, one can easily realize that VC investing is a demanding activity which naturally comes at a high cost, and that is difficult to replicate in a short period. In other words, knowing the VC business models teaches us how difficult it is to replicate it in different context without a large investment of time.

Generating good deals in particularly difficult, because it entails reaching out to entrepreneurs who have either still to deliver a successful business plan, and are therefore not clearly visible to investors, or who have already started doing so and are therefore appealing to many other investors. Being visible and recognized as supportive investor is therefore very important, and VC firms spend time and resources reaching out to the entrepreneurial community. It is also interesting to notice that the majority of entrepreneurs, contrary to some stereotypes, come from established, often listed, companies (Gompers, Lerner, and Scharfstein (2005)). Therefore VC firms are also very active in the corporate space, participating to industry fairs as speakers and active participants. While there is a small but apparently growing number of serial entrepreneurs, they rarely return to their initial funders when they start new ventures, either because they have accumulated enough financial wealth, or because they move into new markets which require different expertise than that of their erstwhile funders (Bengtsson (2013)).

Another important way to access good deals is to cooperate with other VC investors. Syndication is very common, and it has been shown to be beneficial to the performance of companies funded by several VC investors (Chemmanur and Tian (2010)). One reason for this is that syndication allows investors to share information which is particularly valuable in the case of early stage, risky companies (Lerner (1994)). Another advantage of syndication is that it allows VC firms to extend their network and reach out to deals that they would otherwise not be able to invest in. Syndication indeed results into the creation of networks of investors that ensure their members a stable flow of good deals (Hochberg, Ljungqvist, and Lu (2007, 2010).

There is naturally competition among entrepreneurial ventures for funding and among VC firms for promising ventures. We know that VC firms choose on the basis of tangible characteristics like achievements ((Eckhardt, Shane, and Delmar (2006)), but also based on intangible characteristics like founders' ability and sectoral appeal. In fact, it has been shown that more reputable VC firms tend to match with more promising entrepreneurs (Sørensen (2007)), so that part of the success of the VC model is due to its

ability to attract future winners, and not only to VC partners' ability to 'nurture' great companies.

The second major challenge for VC investors is supporting their portfolio companies. Being active investors is in fact a defining trait of VC firms (Bottazzi, Da Rin, and Hellmann (2008)). Supporting is achieved in two main ways. First, VCs offer financial contracts which are complex and aim at motivating the entrepreneur to work hard and bring the company towards highly ambitious goals; contracting also provides VC firms with protection of their funds in case of disappointing performance (Bengtsson and Sensoy (2011), Bottazzi, Da Rin, and Hellmann (2009), Kaplan and Strömberg (2003)). There eare several important characteristics of venture financing contracts. One is the use of 'convertible' securities that allow investors debt-like protection in case of bankruptcy, but can be converted into common equity in case of IPO or successful acquisition. Also, VC investors retain the rights to gain control of the board of directors in case of performance falling below pre-set targets. This is often used to oust a non-performing founder-CEO (Hellmann and Puri (2002)). Second, VC investors are actively present in their companies as advisors, board members, mentors, and also monitors of the entrepreneurs' activity. VC spend considerable time with their companies, helping them reach out to potential customers or suppliers, hire talented employees, recruit board members, deal with regulation, and mentoring the founders about managing a pool of talented individuals in changing markets subject to strong competition (Bottazzi, Da Rin, and Hellmann (2008). Evidence also exists that VC firms tend to bring their companies to cooperate with established incumbents in the commercialization phase of their products, which greatly benefits their ability to generate sales, and profits, within a short period of time from their original innovation (Gans, Hsu and Stern (2002)). Also, VC firms push their portfolio companies to form strategic alliances among themselves, acting as 'intermediaries' that ensure that neither party exploits the other; such alliances are not just cosmetic, since they are associated with more successful performance (Lindsey (2008)). These activities and contributions are (potentially) very valuable to the companies. They are also very expensive, as they absorb valuable time from VC partners. Together with the fact that entrepreneurial ventures are inherently very risky, they contribute to making VC funding expensive: evidence shows that VC firms take about half of the shares of a start-up by the time funding is complete (Kaplan and Strömberg (2003)). Therefore, this type of financing is suitable for companies that expect to achieve 'spectacular' growth in a short period of time, and not for companies that, while profitable, expect to grow at a more normal pace.

The third major challenge of VC investing is to realize satisfactory returns from the portfolio of firms in which a fund vehicle has invested. An important fact to be aware of is that VC investment outcomes are highly 'unbalanced': the typical fund invests in a dozen companies, of which more than half go bankrupt and one or two the remaining ones contribute the vast majority of the fund's total returns through successful IPOs or acquisitions (Puri and Zarutskie (2012)). It is therefore very important to focus the VC energy in identifying which portfolio companies will eventually succeed. This, naturally, may play to the disadvantage of the others, which receive progressively less attention and support, and possibly see also restricted the amount of money they get over time. An important contractual arrangement here is the staging of investments. VCs do not provide companies with all the money they need to achieve success. Rather, they provide enough money to meet a future, well specified, target, which is typically 12 to 18 months ahead. Firms that fail meeting the targets are closed down without much

hesitation. Staging has been shown to be an effective way to help VC firms manage risk and return, and is associated with better exit outcomes (Tian (2011)). Both IPOs and acquisitions are cyclical phenomena. Part of VC firms' ability to generate returns, therefore, relies on their ability to correctly time the market (Gompers et al. (2008)).

Taken together, these facts clearly imply that VC firms are not all the same, and that there is considerable diversification in terms of team composition and strategy. An important consequence for entrepreneurs is that they should carefully assess which type of funder they want, as VC is not a homogeneous form of financing. Firms that are more ambitious and are managed by highly experienced and talented entrepreneurs may well prefer to approach independent VC firms with a good track record, as found by Hsu (2004). A positive relationship between past track record and investment performance is found by Nahata (2008).

3. Implications for public policy

This overview of the nature and operations of VC firms, albeit very concise, points to some important issues that should be carefully considered by policy-makers who intend to create or support entrepreneurship, which are worth pointing out. First, VC organizations rely on experienced and talented individuals, who have accumulated entrepreneurial expertise over many years. Therefore any policy aiming at stimulating a domestic VC industry must have a medium- long-term goal. Second, independent and captive VC firms are very different, are suitable for different types of companies, and can well coexist and cooperate fruitfully. Therefore, a broad approach that allows different organizations to compete and cooperate is likely to be more fruitful. Third, direct intervention by the government as venture capitalist is possible but is not a perfect, not even close, substitute for private initiative. We will elaborate more on these issues more in sections III and IV of this paper.

D. Alternative sources of entrepreneurial finance

We conclude this section by considering that venture capital is a major source of entrepreneurial finance, but not the only one. Partly as a consequence of the success of many entrepreneurial companies during the dot.com bubble at the turn of the century, some important structural changes have taken place a global level. Most notably, the flow of funds from institutional investors into VC fund vehicles has decreased, as these investors have realized the high risks involved, and the fact that relatively few VC firms manage to yield consistently high returns (Phalippou (2010)). This, in turn, led many VC firms to move away from funding companies at seed and early stage, so that they turned to scaling up already successful start-ups. A space then was left open for funding very early stage ventures. Fortunately, this has largely emerged as successful entrepreneurs increasingly started investing themselves as 'business angels.' Angels are private individuals who invest their own money. Some of them do so individually, like Peter Thiel, co-founder of PayPal and angel to Facebook. Others work in small informal groups, like Cambridge Angels, or larger formal organizations called 'Super Angels,' like SV Angels, who invested in PayPal, Twitter, Square and YouTube.

A major difference between angels and VC firms is that the former are individuals investing their own money, not that of others. Therefore angels tend to be more patient, but contribute less money to any single venture, except a few very large groups like The

Founders' Fund. Angels are by no means a US phenomenon, as wealthy individuals across the globe try to earn good returns leveraging their knowledge, experience, and networks (Lerner, Schoar, Sokolinski and Wilson (2015)). Another important trait of angel investors is their diversity, in two dimensions. First, as we have seen, they can be organized in very different ways. Second, some angels are able to commit little more than money, while others can compete with reputable VCs in terms of network, knowledge, entrepreneurial experience. Consequently, entrepreneurs should be quite discerning when accessing finance from angels. It is also important to notice that many entrepreneurs perceive angel funding as a stepping stone towards a venture capital round of financing. This is often the case, but angel financing could also become a hindrance, as they are sometimes willing to offer valuations and contractual terms which are so generous that they can discourage VC investors to provide finance at a later stage (Goldfarb, Hoberg, Kirsch, and Triantis (2012), and Hellman, Schure, and Vo (2015)). This is not surprising, as VC investors need to generate returns for their institutional investors that are sufficiently high, net of their own compensation. Angels, by contrast, may be satisfied by lower returns because they derive a personal utility by the very fact of being involved with ambitious ventures. In this respect, Super Angels often behave more like VC funds, since their members tend to favor financial returns to the pure thrill of being mentors.

Another source of entrepreneurial finance that has been recently developing is crowdfunding. This is an informal source of funding that allows entrepreneurs to address the public at large in order to start operations (Belleflamme, Lambert, and Schwienbacher (2015)). In industries like movies or consumer gadgets crowdfunding has been successful also as a way to obtain advanced-stage customer feedback that is valuable in crafting product characteristics (Larralde and Schwienbacher (2012)). Crowdfunding can therefore be a viable source of early stage finance for companies that do not require large sums of money at that stage. What is unclear is the legal viability of this form of 'atomized' funding, which still has to be tested in court (Heminway and Hoffman (2011)).

Finally, it is useful to mention the fact that many governments provide grants for entrepreneurial companies. This is also a type of funding that can take many sources, from loan guarantees to small grants for the development of prototypes or feasibility studies, to subsidies to start-up incubators. It is difficult to summarize the characteristics of these very diverse instruments, and even more difficult to get a grasp of the overall amounts of money involved. I will discuss some of them in section IV.

E. The contribution of venture capital to innovation and growth

I conclude this section by looking at available evidence on how VC financing contributes to innovation and economic growth. VC is clearly associated with technology and innovation, as it has pioneered investing in risky industries like computers and biotechnologies in the 1980s, internet in the 1990s, nanotechnology and social media in the first decade of the 21st century. Some VC firms have even attempted at jump-starting whole industry segments, like happened with the eponymous Silicon valley firm Kleiner, Perkins, Caufield, and Byers with the Java Fund, launched in 1996 to spur the adoption of Java software applications.

1. Venture capital and technological innovation

Such positive view of venture capital is strongly confirmed by academic research. The first piece of evidence came from Hellmann and Puri (2000), who documented that Silicon Valley start-ups that receive VC funding tend to pursue more innovative strategies that start-ups that receive other forms of funding. VC-backed companies are also faster to bring their products to market. More recently, Puri and Zarutskie (2012) document that VC-backed companies are less than 1% of the total start-ups in the US, that they are concentrated in a few fast-growing industries, and that they account for a large share of young fast-growing companies, especially the really successful ones ('gazelles' and 'unicorns'). By their nature, however, such firms are very few, which brings us back to the important point that VC funding is not a generic solution to entrepreneurs' need for external funding. The fact that VC firms can make a difference in terms of picking future winners is clearly seen in their finding that the vast majority of VC-backed companies receives funding at a time when they still have to achieve any sales, let alone profit. As we have seen above, this is a risky job, and most of the companies end up nowhere, while the few emerging successfully are very soon ready to become public or be acquired by a large incumbent. Also looking at the US case, Chemmanur, Krishnan, and Nandy (2011) document in great detail how VC firms change the productivity of their companies upon funding. While VCs tend to pick companies that are already quite productive before funding, their presence tends to accelerate productivity growth, Interestingly, the acceleration is more pronounced for early stage companies, and for companies that receive funding from more reputable VC firms, i.e., firms which have a more successful history of bringing their portfolio companies public. Both studies show that VC firms act as 'accelerators' of potentially highly productive companies. Money is an important element, but the fact that more successful VC firms help their portfolio companies grow more is a clear indication that there is more than money. To what extent the extra contribution comes from expertise and active support or from networking and access to additional resources is difficult to say, and the available studies seem to point in the direction that all elements play some role. This evidence is also further confirmation that only relatively few VC firms are able to make most of the very successful investments. This is important for policy, as we will see that hastily creating VC newcomers may generate expectations that will be shattered by the harsh reality of things.

Importantly, the evidence on VC firms' contribution to technological innovation is not limited to the United States. This tells us that successful technology can be developed using the VC model also in other economies. In Europe, for instance, VC firms also tend to invest in companies that have already reached some degree of technological maturity, as measured by patents (Engel and Keilbach (2007)). Such approach also allows for a comparison of the effectiveness of US and European VC firms. While this is not enough to draw the debate to a conclusion, Engel and Keilbach (2007) document that in the years around the turn of the century, European VC firms failed to spur the productivity of companies they financed, a result that is in stark contrast with what found by Kortum and Lerner (2000) and by Hsu and Ziedonis (2011) for the United States.

Evidence at a more aggregate is also revealing, though it is methodologically more difficult to draw strong conclusion when using data that put together very different situations. Hirukawa, Masayuki, and Masako Ueda (2011) use advanced econometric techniques to argue that the amount of VC investments in a US state precedes the increase in average company-level productivity, and so is likely to cause it, and not to be

a consequence of a more productive economy that attracts more VC investments. Popov and Rosenboom (2009) provide similar evidence for European countries, so that we can consider this a general results, irrespective of nation. Overall, the wealth of studies that document a positive effect of VC funding on innovation is at this point quite convincing and uncontroversial, and brings a solid justification to policies aimed at fostering the VC industry as a means to achieve a more innovative economy.

2. Venture capital and economic growth

The next question is whether venture capital contributes to economic growth more generally, including a dimension that is very important for policy makers, job creation. Here the available studies bring some interesting facts to our attention, though the conclusions are less compelling than in the case of innovation, partly because the link with economic growth at large are more difficult to document statistically. An important contribution by Samila and Sorenson (2011) measures very carefully the link between city-level VC investment and the subsequent number of new start-ups, number of jobs and level of income, also at the city level. They find that VC investments have a positive effects on all these variables. Popov and Rosenboom (2012) find that also in Europe aggregate VC investments are associated with higher start-up creation. Puri and Zarutskie (2012) put these results in perspective. Using the whole census population of US companies, they document that the 0.1% of start-ups that are VC-funded account for about 5% of total employment over the quarter-century up to 2005. This is an impressive fact, especially if one considers that only about a tenth of VC-backed companies achieve a notable level of success.

An important effect that still remains to be understood is the extent to which VC-backed companies contribute to modernize the economy by displacing companies and industries that are less productive. The recent rise of the ‘sharing economy’ with companies like Uber and Airbnb has mixed, and controversial, implications for policy. The net effect of these changes is likely to be positive, with more jobs being created than those that are lost in companies and industries that lose consumer appeal. However, there are delicate issues of social equity and redistributions that require more analysis before informed policy decisions can be taken for the common good.

III. Which Factors are Necessary for a Vibrant Venture Capital Industry?

Before turning to an examination of public policy for venture capital and of the financing of innovation, it is important to pause and take a careful look at what factors are really important for making venture capital work in the first place. On the bases of such knowledge one can start asking several questions about what sensible policy measure are.

Venture capital is a form of financial intermediation (or investment for business angels). Like any economic activity this requires as fundamental pre-requisite an environment where trust is high and allow parties to engage in risky transactions (Bottazzi, Da Rin, and Hellmann (2016)). There are several elements that contribute to the generation of a stable and trustworthy environment. Fundamentally, these correspond to the institutions that provide the basic structure of the economy: the macroeconomic stability, the legal

system and the rule of law, the quality of accounting standards, the quality of regulation and its enforcement/compliance, the quality of the workforce, and the cultural orientation.

Entrepreneurship consists of picking and managing risky challenges. To be able to do so, individuals need first of all to be able to have confidence on the economic conditions of the country (or countries) they plan to operate in. Countries whose currency is at risk, for example, immediately make themselves unattractive to entrepreneurial activity, also when this is conducted domestically. A volatile exchange rate makes the price of imported goods volatile, generates fluctuations in income and in export prices. It also makes a country unattractive to foreign investors, both when they contribute FDI flows and when they contribute portfolio investments like those of VC firms. Also fiscal fluctuations may contribute to make the economy unstable. An important form of fiscal stability is that of the tax system, whose reliability, transparency, and simplicity are extremely important to both entrepreneurs and investors. Finally, monetary stability is also very important. A stable value of prices encourages economic activity and reassures investors that the value of their credit will not be diminished by inflation. Stable macroeconomic conditions are also conducive to more optimistic views of future growth, and therefore they encourage investment, especially for the long-term.

The legal system is a fundamental pillar of any economic transaction. All economic agents rely on it, and the existence of a robust rule of law is a cornerstone of market economies. In the case of entrepreneurial companies, one main concern is about the reliability of contracting both with business partners and with investors. Such concerns are naturally mutual. Beyond the rule of law, the business friendliness of the legal system is also very important. Entrepreneurs have few financial resources, and when they have to deal with costly legal procedures, as plaintiffs or defendants, they get discouraged and may have to fold up their business inefficiently. Similarly, high costs of legal compliance are a powerful deterrent to entrepreneurs and investors alike.

Accounting standards are a pillar of corporate life, and their effectiveness is a key factor in generating investor confidence in financial reporting. Accounting is, in a sense, the gatekeeper of investors' trust, as unreliable make it difficult to understand what is going on in a company.

The importance of regulation and its enforcement is also a major factor in the decisions to start a business and to invest in it. Regulations constitute a potential barrier to entry and a deterrence to engage in economic activity. In this sense, ineffective regulations may be a powerful deterrent to innovation and investment. Their role is so important that the World Bank 'Doing Business' project has become over just a few years a closely watched measurement benchmark, used both in academic research and policy debates.

The quality of the workforce is also very important to keep a country attractive to investors and entrepreneurs. Productive workers are very important in any company, to the point that recently Mercedes Benz decided to revert back from robots to expert human workers for the finishing of its cars' interiors. It realized that 'reprogramming' across different tasks expert human workers is faster and cheaper than for software-controlled machine. Workforce quality depends on several factors, but crucial among them is the educational system, both academic and vocational.

The final pillar necessary to support a vibrant venture capital industry is culture. There are several cultural dimensions relevant to venture investing. One is integrity and reliability of business conduct, which can greatly influence the costs of protecting one's interests. Another is the inherent entrepreneurial spirit of a population, and the attitude towards risk. Also the attitude towards social and economic inequality is important, as it may act as a powerful deterrent of ambitious ventures.

IV. How Can Policy Support Venture Capital?

I now proceed to examine more in detail what active policies can contribute to support, and in some cases even create, a venture capital industry. This is a very difficult question to address because of a fundamental problem: entrepreneurship and its financing have a long-term nature that is often difficult to reconcile with the short-term nature of the political process. I will keep returning to this point throughout the section.

One simple and effective way to characterize policies for venture capital and innovation is to distinguish those that aim to increase the demand for VC funding, largely through the support of the creation of entrepreneurial ventures, and those that aim to increase the supply of VC financing, largely by making this more attractive to intermediaries and investors. I will therefore examine at each set of policies in turn, and the attempt to derive some conclusions which are supported by existing research. This will put us in a position to address issue relevant to Asia and the Pacific on reasonably solid grounds.

A. Demand-side policies

While individual initiative is at the heart of entrepreneurship, public policy has many ways to contribute to support the ambitious entrepreneurial initiatives. As I have argued in section III, an important role for the government is to create and maintain general economic and institutional conditions that are conducive to entrepreneurial initiative. While institutional stability and quality has much wider implications than for entrepreneurship alone, it is important to notice that it also benefits new firm creation by creating a healthy economic environment with strong activity by established firms, strong competition among them and with foreign companies, and as a consequence constantly growing productivity.

In this section I look at three types of specific policies that may affect the development of entrepreneurship. I will focus on policy dimensions that may have particularly strong effects for the creation of new companies, rather than for the growth of existing ones.

1. Fostering competition among companies

The first policy dimension to consider is the degree of competition in the economy, especially from foreign companies. Competition has been shown to be very important for innovation (Aghion et al. (2005) and for economic growth (Aghion and Griffith (2005)). Competition is particularly important for entrepreneurial companies for two orders of reason. First, new companies that have ambitious goal need to find space in the economic environment to grow. An economy where incumbents are protected and can entrench themselves from new challengers is not attractive to entrepreneurs. While I am not aware of specific studies on this topic, a simple look at which are the most

innovative economies also points to them being, among other things, very supportive of competition in product and service markets. The second reason why competition is a necessary condition for entrepreneurial success is that competition from abroad is particularly useful to force new ventures to become themselves competitive from the start (Bloom, Draca, and van Reenen (2016)). Indeed, economists have long abandoned the idea that the protection of infant industries may be a successful policy (Baldwin (1969)). Once again, without any goal of proving causality, innovative economies are mostly open to competition from abroad. As foreign competition improves productivity (Pavcnik (2012)), new companies that are born in economies open to imports and FDI are structurally more productive. Being born in a demanding environment means that start-up often prepare themselves from early on to become exporter themselves, but also to cooperate and forge alliances with foreign companies. In a globalized world, being born as 'entrepreneurial jet-setter' may prove a long-lasting advantage.

2. Fostering the creation of new technology

The second policy dimension relevant for creating entrepreneurship is the development of a solid technology base and of highly qualified human capital. As we know from Schumpeter (1942), technology is a major driver of creative disruption and of the creation of new business models that enrich individuals and make life better for society as a whole. Clearly, technology development is largely driven by private initiative, as it is by experimentation that new ways to create solutions to problems arise. There are several ways that public policy can contribute to technology development. First, and most natural, the creation of new technology is an intellectual pursuit that takes place in universities and labs, public or private. Therefore, the government can influence entrepreneurship by creating and maintaining effective universities, most of which are public in (almost) all countries. This may seem a simple and straightforward task, but it is not. In fact, interestingly, universities tend to thrive as creators of new knowledge exactly in the conditions where entrepreneurial start-up do: free circulation of brains and money, competition, a sound institutional environment (Aghion et al. (2010)). Interestingly, providing more funding to universities does not necessarily result in more scientific output, unless they are subject to keen competition from national or international peers. A wise design of a national university system is therefore an important early step towards the support of entrepreneurial ventures. In this respect, the US system of high competition for students and mobility of professors is one possible effective solution. But it is not the only one, as systems where public funding and oversight are prevalent may also prove effective, like in the case of the British system of the French system of '*grands écoles.*'

Beyond higher education, technology also arises from the money put to finance laboratories and research projects. Here an important feature of government policy is its potentially forward-looking attitude. As we know, many fundamental discoveries have not be the outcome of targeted research, but rather the serendipitous fruit of basic research which had little immediate commercial urgency or motivation. So the role of government for helping long-run, basic research is a potentially very fruitful policy. There are many ways this can be accomplished. For example, (co-)investment of long-term industrial project that require fundamentally new technology is likely to lead to many commercial applications down the road, like in the case of the technologies developed for space activities in the race to land on the moon. Also military expenditure, albeit controversial, has a long-term nature that promises to yield indirect applications

with commercial value along the road.

It is worth further remarking on the importance of a structural dimension that is very important for entrepreneurship: intellectual property rights. Intellectual policy often constitutes an important protection for new companies that shields them from predatory behaviour by incumbents who could easily commercialize their invention. Creating an efficient system of intellectual property rights also allows the creation of a market for technology that has been shown to be very important for allowing companies to make use of the technology they need (Arora, Fosfuri, and Gambardella (2001)). Even in open source technologies, the rights to certain developments or the original technology are important for further commercial applications (Lerner and Tirole (2002)).

3. Fostering an entrepreneurial culture

The third type of policy dimension that has important effects on entrepreneurial activity is the creation of a culture that rewards experimentation, risk taking, and therefore tolerates failure. This is a very difficult topic, because it is naturally difficult for a policy-maker to influence cultural values and attitudes. This is a very slow-moving trait of a population, and one cannot change it by decree. However, there are some possible measures that can help showing the attractiveness of entrepreneurship. For example, governments affect whether bankruptcy rules translate in a stigma for failed entrepreneurs or in sign of experience (Landier (2006)). Economies that systematically penalize failure discourage risk taking, and we know that risk tolerance is beneficial to innovation (Azoulay, Manso, and Zivin (2011), Tian and Want (2011)).

B. Supply-side policies

While supporting the creation of entrepreneurial ventures that create demand for funding may be difficult to a policy-maker because it requires policies that are long-term and appear difficult to communicate to the entrepreneurial community, supporting the supply of funds to entrepreneurs is apparently easy. However, spending public money to entice the supply of funds is also a treacherous route, which

In this section I look at policies that may affect the supply of funds for entrepreneurial ventures. I will focus on three types of policy: subsidies to investors, including tax advantages, direct investment through different types of vehicles, and measures to spur the VC industry.

1. Subsidies to VC investors

Subsidies to investors are a very easy measure to enact, and are also palatable to policy-makers because they can be easily communicated and have short-term effects. However, subsidies are costly and they may have unintended effects. In fact, there is no systematic study that compares the cost and benefits of subsidies to investors. A serious analysis in this direction would be very valuable for assessing policy. We also know relatively little on the effectiveness of subsidies, since they may take very different forms. On a general level, Da Rin, Nicodano, and Sembenelli (2006) find that in the 1990s in Europe lower capital gains tax rates favor relatively more the investment in earlier stage ventures as well as in technological riskier sectors. Capital tax gains depress investments in early stage and technology ventures by reducing the incentives of investors to put money in

those type of ventures that are riskier but also have higher potential upside. By moving towards safer investments VC firms can therefore save the additional cost of paying a high tax on their capital gain. By reducing the financial gains at the moment of exiting the investment, capital gains also reduce entrepreneurs' willingness to work hard to find successful strategies (Keuschnigg and Nielsen (2004)). There is also a debate about the explicit guarantees that some governments provide to venture investors in case of failure of their portfolio companies. From an economics perspective this is a clearly very dangerous choice, because the risk reduction implicit in the subsidy will make VC investors

2. Direct investment into venture capital

Direct investment by the government takes the form of either establishing public VC firms, or of investing into private VC fund vehicles. Da Rin, Nicodano, and Sembenelli (2006) find that the European experience of the 1990s does not support the notion that more public funds directed towards venture investment is effective. On the contrary, they find that the large sums put at play have failed to stimulate the flow of investments into early stage companies.

3. Fostering the development of the VC industry

There are a variety of specific policy measures that can be used to create a larger and more effective VC industry. Some we have already examined in section III, when we have considered the general conditions for the development of entrepreneurship and entrepreneurial finance. Here I focus on more specific measures that target VC firms directly.

A natural measure is to make investment into VC fund vehicles by institutional investors attractive. Gompers and Lerner (1998) argue that in the US the 1979 ruling that allowed pension funds to invest in VC fund vehicles created the conditions to greatly expand the supply of funds into the VC industry. This result however does not account for the possibility that at the same time the demand for funds also increased, leading to larger VC investment irrespective of the policy ruling.

A different approach for the government is to create an agency that acts as public VC firms and invests directly into companies. This is for example the case of the US Small Business Innovation Research programme in the 1980s (Lerner (1999)). There are two aspects to these efforts. First, these agencies tend to complement private VC fund and often cooperate with them in providing funding to companies that are deemed valuable by private VC firms. Second, in the US case the development of the public VC firms fostered the maturation of the industry by allowing individual managers to accumulate investment experience that many of them then transferred to private VC firms. Additionally, the volume of investment made by public VCs was enough to support the initial development of specialized service providers like accountants, lawyers, investment bankers, and head hunters, that are very important for the operation of the VC model.

As we have seen in section I, a very important element for VC firms is to generate good returns to their investors by existing their companies. An IPO on a public market is arguably the most successful exit (Phalippou and Gottschalg (2009)). It is therefore

important that successful ventures are able to list on a stock exchange with reasonable costs and with reasonable requirements. Listing a portfolio company allows VC investors to 'recycle' the financial capital they manage when it becomes less needed, and to put it back to work where they are most productive (Michelacci, and Suarez (2004)). As a secondary effect, knowing that a listing in a country is possible, also foreign investors will be more willing to invest, as they have more reassurance of a good path to exit. Assessing the European experience, Da Rin, Nicodano, and Sembenelli (2006) find that opening stock exchanges targeted at innovative companies had a positive effect on the willingness of VC firms to invest in early stage companies.

C. A balanced path towards creating a successful venture capital industry

We now have enough elements to identify the main issues surrounding a viable policy for a successful VC industry. Let's start with the limitations. We have argued that an inherent obstacle to effective policy for venture capital is the time mismatch between the long-term nature of most effective policies and the short-term horizon of policy-makers. This is important because the risk that sub-optimal short-term policies are undertaken is always there. The main issue to discuss at this point is that a good policy cannot be piece-meal but help shape and sustain what economists often dub the 'entrepreneurial ecosystem.' An ecosystem is a set of elements that mutually sustain and reinforce each other. In this respect, I will now review some questions that are relevant for the VC industry.

An ecosystem is balanced, so any government policy should avoid being too small to result ineffective as well as too large as to upset the incentives of private agents. For instance, creating a very small public VC agency, or one which has unstable funding and a short-term horizon, is likely to have no appreciable effect. Also being too large can do damage, by the crowding out of private investors. An ecosystem is also a resilient creature that does not need external protection to survive and prosper. Therefore an overly protective environment is not going to be sustainable once the supports are lifted. As I have remarked about the effect of competition on start-up vitality, a VC industry that is able to support ventures that are subject to competition from abroad, and that is able to withstand itself the competition of foreign investors is mature, will make successful investments and will reward its own institutional investors. A different type of resilience is the ability to attract and retain elements. Policy-makers should be aware that both entrepreneurs and capital are mobile, and that for them leaving is much easier and faster than deciding to come back again in the future. Therefore, measures that risk disrupting the confidence of the venture community should be considered with much pause. A simple measure of the difficulty to retain talented human capital is the fact that Silicon Valley, where talent can expect to receive reward, is full of 'refugee' entrepreneurs from many different countries. These people have left their home countries because these have failed in developing attractive ecosystems, where talent can express itself and reap its rewards.

A difficulty in keeping an ecosystem vital is to balance the interests of its participants. In the case of entrepreneurship, the view of the economist is that there are gains from trade that can create a situation where all parties involved are satisfied. Reality is bit more complicated, since some of the parties are in fact losing out to innovators, and in certain cases they are difficult to compensate. The recent debates on the 'sharing economy' are a clear example. Companies like Uber and Airbnb create wealth but they also upset

established industries and vested interests, namely licensed taxi-drivers and hotels. This creates tensions and clearly also pressure on policy-makers, who need to balance their decisions. A bright side of this debate is that it has raised public awareness that change, while for some painful and costly, can create enough growth and wealth for society at large that, hopefully, those who lose out can be compensating without them blocking a generally beneficial progress.

It is useful to consider an example of how the ecosystem concept may be practically relevant for public policy. A recent study by Samila and Sorenson (2010) finds that US federally funded research leads to an increase in patenting rate within the same region. Interestingly, this effect holds true only in regions where there is an active VC industry. This result is apparently in contrast with that of Da Rin, Nicodano, and Sembenelli (2006), who find that increases in public R&D in Europe has not changed much the way VC funds invest. One way to reconcile the two results is to consider that the effectiveness of public R&D may well depend on other characteristics of the surrounding environment, for example the presence of an already vibrant VC industry in the United States and not in Europe during the 1990s. Such contextual results are very important because they point us to a sobering view of any analysis that focusses narrowly on one dimension of this complex ecosystem, thus failing to reach a deeper appreciation of the underlying relationships between institutional elements.

I conclude this section by considering that an ecosystem needs maintenance. This means that, irrespective of the apparent degree of success, a very useful practice for any policy-maker is conducting thorough assessment exercises of the policies they have put in place. These systematic assessment, to be planned as soon as a policy is approved, and conducted promptly, are a very useful tool to monitor the progress of policy implementation, and are also very useful to motivate a careful policy design. They naturally allow improvements over time, and would contribute to generate widely available knowledge useful for future decisions.

V. What Role for Venture Capital in Asia and the Pacific?

In this last section of the paper I bring up some considerations that may be particularly relevant for policy-makers in Asia and the Pacific. Clearly, a detail assessment of specific country situations goes beyond the scope of this paper, as it would need considering country-specific factors and situations. I therefore focus on some considerations that arise from a simple empirical exercise, and relate them to address general issues faced by the countries in these regions.

I start by noticing that the Asian region consists of a much differentiated set of countries, so it is difficult to provide general advice. Asia is a young region with a rich entrepreneurial culture, where exchange and gains from trade are experience by large populations. This is in principle a fertile environment for innovation, as success story like Alibaba, among many, confirm. While technological innovation is concentrated in relatively few places, such concentration is also found in North America and Europe, where relatively few regions lead in terms of technology start-ups. This is a fact one has to reckon, as not all countries and regions, in the short term, have the qualities to thrive in technological innovation. In particular, some countries are economically very small, with limited internal markets, and with low levels of per capita income. It will be

difficult for such countries to develop innovation-led growth where venture capital can play a relevant role.

The data contained in Table 1 provide some useful evidence that naturally lends itself to some comments. Panel A of the Table contains data for countries in Asia and the Pacific. Panel B of the Table contains data from some other countries in North America and Europe, plus Brazil. Each panel provides several data, organized by country. Countries are ordered by the size of their VC industry, measured by the total amount invested between 2006 and 2015. I look at a whole decade because of the long-term nature of this industry. A long-term view also allows to average out yearly variations, which are interesting to understand but are of somewhat little interest in the context of this paper.

A first consideration comes from comparing the two Panels of the Table. By looking at column (viii) of each Panel, we see that Asian countries have only in few cases been able to build up large domestic VC industries, with the notable exceptions of China and India. Two countries which show a considerably small size of their VC industry, especially compared to their GDP are Russia and Japan. In both cases, entrepreneurship finds it difficult to take off. In Russia a likely explanation is the lack of institutional infrastructure, in Japan it is probably more a cultural factor, and the presence of an economy which is difficult to penetrate to outsiders. If one digs deeper, column (ix) reveals that only one of the smaller Asian countries has managed to develop a VC marketa that are relatively large compared to the country GDP. This country is Singapore, which has been a success case both for economic and technological development and for VC itself. Column (ix) also shows that China and India have large VC industries also relative to their GDP. While a majority of the reference countries in Panel B have VC industries that above 0.5% of their GDP, all Asian countries apart from China, India, and Singapore, exhibit ratios that are well below this value. It is also worth noticing that Asian countries not reported in Panel A do not have VC activity recorded in the source database, ThomsonOne. Interestingly, column (x), when confronted with tables (viii) or (ix) points to the fact that the size of the VC industry is somewhat correlated with the average GDP growth rate in the last decade, but only loosely so. In other terms, it points to policies conducing to grow not being sufficient to stimulate a VC industry. As I have argued in sections III and IV, public policy for VC is complex and multi-faceted, and cannot be simply subsumed into good macroeconomic policy.

Moving to the deal-level data on the left of each Panel, a comparison between China and India with the United States is sobering. Even in the two largest Indian economics and VC markets, the number of deals, the number of companies that are VC-backed, and the number of VC firms active in investing remains a fraction of those in the United States. Columns (iv) to (vi) provide evidence that the size of deals in Asia is not so different from the rest of the world. While the United States may be viewed as an ‘out-liar’ in the sense of remaining by far the biggest VC market in the world, it is also telling that Asia lacks Europe, too. This is, in a way, more interesting because Europe is clearly a closer target in terms of technology development and also support of entrepreneurship. Probably much could be learnt by a comparison of European and Asian policy approaches.

Annex

Summary statistics for VC deals, 2006 to 2015							
Company Nation	Deals, total (number)	Companies, total (number)	VC Firms, total (number)	Average Investment, per Deal (USD m)	Average Investment, per Company (USD m)	Average total investment, per VC Firm (USD Mil) (USD m)	Total Capital Invested (USD m)
China	6,284	4,467	1,350	13	19	61	82,721
India	2,169	1,407	522	11	16	44	23,103
South Korea	1,182	904	132	3	4	30	3,972
Japan	912	715	200	4	5	18	3,680
Russia	419	326	179	8	11	19	3,487
Singapore	286	199	231	10	15	13	2,973
Malaysia	47	40	49	15	18	14	701
Taiwan	109	88	95	6	7	7	644
Vietnam	69	59	28	4	5	11	299
Ukraine	32	29	28	6	7	7	198
Indonesia	52	43	50	3	3	3	134
Turkey	58	51	46	2	3	3	129
Philippines	20	14	31	4	6	3	90
Pakistan	12	11	13	6	6	5	67
Thailand	28	25	36	2	2	1	46
Sri Lanka	4	4	4	10	10	10	41
Kazakhstan	3	3	2	12	12	18	36
Cambodia	2	2	3	10	10	6	19
Armenia	3	2	3	3	4	3	8
Georgia	3	3	3	2	2	2	5
Kyrgyzstan	1	1	1	5	5	5	5
Uzbekistan	2	2	2	2	2	2	3
Total	11,697	8,395	2,304	10	15	53	122,359
Source: ThomsonOne							

Summary statistics for VC deals, 2006 to 2015							
By Company Nation	Deals, total (number)	Companies, total (number)	VC Firms, total (number)	Average Investment, per Deal (USD m)	Average Investment, per Company (USD m)	Average total investment, per VC Firm (USD Mil) (USD m)	Total Capital Invested (USD m)
United States	41,018	16,807	5,017	8	20	68	338,940
United Kingdom	3,544	2,143	1,032	6	10	21	21,698
France	2,827	2,066	547	4	6	22	12,084
Germany	2,573	1,619	660	4	6	15	9,761
Sweden	1,158	753	286	5	8	22	6,198
Switzerland	453	263	261	7	12	12	3,165
Netherlands	521	364	256	6	8	12	3,024
Brazil	289	226	161	10	13	18	2,954
Finland	754	471	167	2	4	11	1,778
Total	53,137	24,712	6,272	8	16	64	399,603
Source: ThomsonOne							

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